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The University of Melbourne
School of Computing and Information Systems
SWEN90016 Software Processes and Management
Semester 1 – 2019

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Assignment 1

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Due Date: Friday, 5th April 2019, 11:59 pm
Assignment Weight: 20%

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Overview:

This is an individual assignment. It deals with the topics of project management, software development lifecycles, process design and project plans. The main aim of this assignment is for you to develop a better understanding of various lifecycle models and their relationship to other aspects of the project, through analysing the AquaX case study, described in Appendix A.

Learning Outcomes:

Through analysing the project described in the case study the students will demonstrate the ability to:
- Identify the goals of the project
- Identify the key characteristics of the project
- Identify the risks in the project as identified at the start of the project
- Justify the choice of an appropriate software development lifecycle (SDLC) model for the project

Report:

Read and analyse the AquaX case study in Appendix A and answer the following questions related to the software product that is described in the case study.
Your answers must have the appropriate justifications and citations where appropriate; use IEEE citing and referencing (IEEE. Monash University Library Guide, 2018. https://guides.lib.monash.edu/citing-referencing/ieee).

Section 1: Short Research Questions

1. Identify the major goals for the software product. (maximum 50 words - 1 mark)

2. Identify the value of the software product to the external stakeholder/s. (maximum 50 words – 1 mark)

Section 2: Extended Research Questions

3. Identify two challenging characteristics (characteristics that would make the project difficult) of this IT project (maximum 200 words – 2 marks)

4. Identify and justify two specific risks to this project, (not generic such as running out of budget or IT security risk). Describe what impact these two risks could have on the business, project and/or the software product and a possible risk response strategy can be used to (maximum 250 words - 4 marks)

5. Identify 4 high level features (functions the IT solution should provide) of the initial software product (the first 6 months) and categorize their priority as high (must have), medium (good to have) or low (can do without). Give a justification for the chosen priority of each requirement. (4 marks)

Requirement	Priority	Justification

Section 3: Discussion

6. Discuss two possible lifecycle models you would consider for the project SDLC model. This should include the pros and cons of each of your choices referring to specific project characteristics and risks *you* have identified. Use case study references to support your argument. (maximum 800 words – 6).

7. From the 2 possible choices in Q6, chose the most suitable SDLC and justify your choice referring to specific project characteristics and risks you have identified. (maximum 200 words – 2 marks)

Quality and presentation: -2 marks

Submission:

Submit your work using the Turnitin link on the subject LMS. Go to the SWEN90016 LMS page, select Assignment submit link from the subject menu, and then select View/Complete from the Assignment item and following the instructions, upload a PDF file containing your responses to questions.

Your submission must include the following:

SWEN90016 Software Processes and Management — Assignment 1
Name:
Login:
Student ID:
Report Body

Late Submissions:

Late submissions without an approved extension will be subject to a penalty of 1mark per day. Week-ends count as a single day. No assignment will be accepted more than one week late.

You will have to make reasoned choices. The real learning experience here is in developing the logic to justify a course of action or a set of choices.

Plagiarism:

The University plagiarism policy applies — see the LMS for a statement of the expectations.

Appendix A – AquaX

Individuals who collect fish or buy fish as pets often keep these fish in a fish tank known as an aquarium. An aquarium is a water-filled tank in which fish swim about. They are usually made from either glass or acrylic. These aquaria are bought from pet-stores or speciality stores. Most aquaria also often have aquatic plants. There are larger public aquariums in many cities. This kind of aquarium is a building with fish and other aquatic animals in large tanks. A large aquarium may have otters, turtles, dolphins, and other sea animals [1]. Individuals who own aquaria can be people who have bought a fish as a pet for instance a child's birthday present. In this instance freshwater fish such as a goldfish are quite popular. There are also people who are more serious, *hobbyists* who are passionate about collecting fish and as such may purchase some very expensive and rare fish to be housed in a more elaborate aquarium. An aquarium is better than a simple fishbowl as it provides certain functionality to help keep the fish healthy. An aquarium traditionally has certain key equipment that monitor and provide an ideal environment for its inhabitants to live. This equipment monitors pH Levels, water temperature and nitrogen levels.

Ph levels
Of primary importance to the fish in the aquarium is the pH level. Most people fill their tanks using tap water. The solute content of the water influences how the organisms in the water interact with their environment. The salt content (salinity) is one of the basic measures of the water conditions. Some aquarists modify the alkalinity of the water by adding chemicals such as sodium bicarbonate to raise the pH [1].

Water temperature
The temperature of the water is important as drastic changes in temperature can cause the organisms in the water to become diseased or even die. It is important that the temperature range is consistent regardless of the type of aquarium. Aquariums are generally classified into 2 either tropical or cold water which is determined by water temperature. Tropical fish are more common and tolerate an average temperature of about 25 °C (77 °F). Cold water fish (as the name suggests) are better suited to a cooler environment. In order to regulate the temperature aquaria can be equipped with a thermostat and a heater and cooler [1].

Nitrogen levels
Of primary concern to the aquarist (the person who manages the aquarium) is management of the waste produced by an aquarium's inhabitants. Fish, invertebrates, fungi, and some bacteria excrete nitrogen waste in the form of ammonia. When fish are put into an aquarium, waste can quickly reach toxic concentrations in the enclosed environment unless the tank is cycled to remove waste. A well-balanced tank contains organisms that are able to metabolize the waste products of other aquarium residents. These organisms include bacteria and aquatic plants that eliminate nitrogen waster by metabolising ammonia and nitrate. This process is known in the aquarium hobby as the nitrogen cycle. There are commercial products sold as kits to "jump start" the nitrogen cycle [1].

Mr X is an owner of a tropical aquarium where he collects fish. Mr X works at a pet speciality store where he is very knowledgeable about many different pets, however fish is his main passion. He is also a technology enthusiast who sees the value in having technology help monitor his aquarium. Furthermore, he is constantly on different fish hobbyist discussion websites and part of different fish hobbyist internet groups. He sees an opportunity to create a website (with an app) where users can monitor their aquarium. He also sees the social element of his hobby and would like the platform for fish hobbyists to connect. In this way this website will differentiate itself from similar websites as it will provide users the ability to view each others' aquarium and data from the aquarium (if the user wishes to share this information). It will also provide a platform for the hobbyists to discuss and share information. He sees a potential money-making opportunity as this website would be the target audience for different aquarium brands and creators of aquarium monitoring technology devices to advertise and sell their products.

Mr Y is also a fish hobbyist who is in his early 70's. He discovered his passion for fish when he retired at age 65. This was after he sold his successful business for a huge profit. He spends all day monitoring his fish, buying books about fish, taking books about fish out the library and researching fish. His grandchild taught him how to use the internet, so he also browses websites about fish. He also knows how to use google to search for information. Recently, Mr Y began to spend many hours at the speciality store where he bought his aquarium (and where Mr X works). There Mr X and Mr Y spend hours chatting about their prized possessions (their fish). Mr X starts to tell Mr Y about his website ideas and Mr Y who sees the value in a website such as this would be happy to spend some of his money in helping Mr X start this website. Mr X contacts you for advice, knowing that you have a basic knowledge on with software processes and management, with his vision to create this multi-purpose website to enable users to monitor their aquarium, connect with others and share information about their aquarium and discuss fish related topics.

The website should display data from the users' aquarium. There will be some manual entry of data such as number of fish and types of fish and size of aquarium, but other data such as the temperature, pH and nitrogen levels should be read automatically from the tank. There are special devices that you can buy that test these levels and these devices can send this information. The data should be displayed in a user-friendly way.

This is where Mr X gets his inspiration from his Fitbit and uses the term 'AquaBit' to describe it. Like the Fitbit, the display should provide the user with important data about the aquarium. This data speaks to the *health of the aquarium* and includes the temperature, pH level and nitrogen levels. Furthermore, there should be some way of setting ideal levels so that the interface can alert the user when there are problems. For instance, the user should be able to set different levels to indicate normal and if there is a potential problem. For instance, with regards to temperature. if the temperature range goes above and below a certain temperature, the display should turn yellow (for warning) and if the temperature goes to another level (can specify either too high or too low), the display should be red (to indicate danger that the fish may get sick or die). The same functionality should exist for pH levels

and nitrogen levels. As such there should be 3 levels for every monitoring function- normal, warning and danger. Data about the aquarium is not visible to anyone else on the site unless shared by the owner.

Often hobbyist also have lights and cameras set up over the aquarium (which may be motion activated). The website should also connect to these devices and provide an interface for interacting with them. For instance, the user can switch on the lights and camera from a separate location and view his aquarium from the website. Mr X thinks it would also be great if there was an option for the sensor to activate the camera and to display on the website, however this is a further requirement.

From Facebook, he sees the system as connecting individuals like himself and Mr Y. He views the website as a platform for fish hobbyist to discuss fish-related topics such as the pros and cons of different brands of aquaria, to share information (such as tips and tricks about their fish and aquaria), to ask questions (like a group discussion forum), and if they wish post data from their aquarium (this data is usually private). Users can sign up as either an active member or an observer. An active member can post and answer questions, however an observer can just read the content. The content should be searchable.

Mr Y has agreed to spend $100 000 on this project for the first stage of development which needs to be completed in 6 months. The first stage of development is the 'AquaBit' as described above. Mr Y is not very familiar with technology and has not used discussion forums and Facebook. Mr X hopes to spend the next 6 months (while your company is developing the 'AquaBit' website) showing and teaching Mr Y more about internet's social capabilities. Mr X believes that if he does, he can convince Mr Y to spend more money on extending the website to include the social platform. He also plans to sell the potential value of doing so as being financially lucrative, as it can attract advertisers.

There are certain key aspects that are therefore part of the initial development of the 'AquaBit' website.

<u>User Profile</u>
> Basic Signup information
>> * username,
>> * password,
>> * name

> Users may want to give their location as this would be 'a nice to have' when the social aspect of the website is developed.

<u>Aquarium Profile</u>
> Aquarium brand
> Tank capacity
> Number of fish and species type

Data for each Fish
- Species.
- Date of fish born/introduced to aquarium
- Typical lifespan

Aquatic plants

Other

All this data will need to be manually added by the user when they sign up to the website. The user can modify the data at any time. For instance, the user may buy more fish or a fish may die and as such the aquarium profile may change. The data in the aquarium profile should be searchable.

It is important to consider that users may have more than one aquarium (and that aquarium will probably be completely different in terms of number and type of fish species). The first offering of the website should support only one aquarium however in the future, users should be able to monitor multiple aquaria.

In order to develop this website, data should be retrieved via different devices in the aquarium.

Syncing with other devices
- Camera
- Sensors
- Thermometer
- Ph Levels tester
- Chemistry tester

These devices can be bought from the pet shop and link to the users' home wifi. When a user logs into the website, the aquarium data should be retrieved. In the display it should state the day, time and whichever data it is retrieving. If the user refreshes the website, the aquarium data should be re-retrieved. If the user does not query data, the website should retrieve the data 30 minutes after the last retrieval (either login or refresh).

Future enhancements

There are many extensions (discussed above) that can be made after the initial website release after 6 months.

[1] (2019, January 13). Aquarium [Online]. Available: https://en.wikipedia.org/wiki/Aquarium